

AMENDEMENT**To the Claims:**

Please amend the claims as follows:

1. (currently amended) A method used by a hardware apparatus for determining a reference image block in direct coding mode, comprising the steps of:
 - (1) obtaining a motion vector in a backward reference frame of a B frame with respect to a current image block;
 - (2) obtaining a motion vector $MV(x,y)$ for direct coding a current B frame image block in accordance with the obtained motion vector of a corresponding image block in the backward reference frame,
 calculating a forward motion vector MV_F of the current block by using the following formulas:
 assuming $scale_factor = 2^{shift_len}$, $td = tp - tb$;
 if $mv(i) < 0$:

$$MV_F(i) = - (((scale_factor / tp) \times (1 - mv(i) \times tb) - 1) \gg shift_len)$$
 else,

$$MV_F(i) = ((scale_factor / tp) \times (1 + mv(i) \times tb) - 1) \gg shift_len$$
 calculating a ~~forward~~ backward motion vector MV_B of the current block by using the following formulas:
 if $mv(i) < 0$:

$$MV_B(i) = ((scale_factor / tp) \times (1 - mv(i) \times td) - 1) \gg shift_len$$
 else,

$$MV_B(i) = -(((scale_factor / tp) \times (1 + mv(i) \times td) - 1) \gg shift_len)$$

where the scale_factor value is a decimal fraction amplification factor; the shift_len denotes times for right shift and shift_len is a natural number; MV_F and MV_B denote a forward motion vector and a backward motion vector corresponding to the current block; tb is a distance in time domain between a current picture and a forward reference picture; td denotes a distance in time domain between a forward reference picture and a backward reference picture; tp is a distance in time domain between a current picture and a backward reference picture; $MV(i)$ denotes a horizontal component or vertical component of motion vector of the corresponding part of the backward reference picture with respect to a forward reference frame; $MV(x,y) = (MV(x), MV(y))$ is a two-dimensional vector, of which the corresponding components are $MV(x), MV(y)$; $MV(i)$ denotes $MV(x)$ or $MV(y)$; and a/b denotes integering an integer of a quotient of a and b towards zero, a is the dividend of $MV_F(i)$ or $MV_B(i)$, b is the divisor of $MV_F(i)$ or $MV_B(i)$; (3) the forward and backward image block pointed by the motion vector obtained from step (2) acting as a reference image block of the current image block.

2. (currently amended) The method used by the hardware apparatus for determining a reference image block in direct coding mode as claimed in claim 1, wherein in step (2), the following method can be used to obtain a motion vector $MV(x,y)$ for direct coding a current B frame image block:

calculating a forward motion vector MV_F of the current block by using the following formulas:

assuming $scale_factor = 2^{shift_len}$,

if $mv(i) < 0$:

$$MV_F(i) = -(((scale_factor / tp) - (tb \times scale_factor / tp) \times mv(i)-1) \gg shift_len)$$

else,

$$MV_F(i) = ((scale_factor / tp) + (tb \times scale_factor / tp) \times mv(i)-1) \gg shift_len \quad [[\quad]]$$

calculating a backward motion vector MV_B of the current block by using the following formulas:

if $mv(i) < 0$:

$$MV_B(i) = ((scale_factor / tp) - (td \times scale_factor / tp) \times mv(i)-1) \gg shift_len$$

else,

$$MV_B(i) = -(((scale_factor / tp) + (td \times scale_factor / tp) \times mv(i)-1) \gg shift_len)$$

where the $scale_factor$ value is a decimal fraction amplification factor; the $shift_len$ denotes times for right shift; MV_F and MV_B denote a forward motion vector and a backward motion vector corresponding to the current block; tb is a distance in time domain between a current picture and a forward reference picture; td denotes a distance in time domain between a forward reference picture and a backward reference picture; MV denotes a motion vector of the corresponding part of the backward reference picture with respect to a forward reference frame; $MV(x,y) = (MV(x), MV(y))$ is two-dimensional vector, of which the corresponding components are $MV(x), MV(y)$; $MV(i)$ denotes $MV(x)$ or $MV(y)$; and a/b denotes integering a quotient of a and b towards zero.

3. (currently amended) The method used by the hardware apparatus for determining a reference image block in direct coding mode as claimed in claim 1, wherein in step (2), calculating a forward motion vector MV_F of the current block by using the following formulas:

assuming $\text{scale_factor} = 2^{\text{shift_len}}$, $\text{td} = \text{tp} - \text{tb}$;

if $\text{mv}(i) < 0$:

$\text{MV}_F(i) = -(((\text{scale_factor} / \text{tp}) \times (1 - \text{mv}(i) \times \text{tb})) \gg \text{shift_len})$

else,

$\text{MV}_F(i) = ((\text{scale_factor} / \text{tp}) \times (1 + \text{mv}(i) \times \text{tb})) \gg \text{shift_len}$

calculating a backward motion vector MV_B of the current block by using the following formulas:

if $\text{mv}(i) < 0$:

$\text{MV}_B(i) = ((\text{scale_factor} / \text{tp}) \times (1 - \text{mv}(i) \times \text{td})) \gg \text{shift_len}$

else,

$\text{MV}_B(i) = -(((\text{scale_factor} / \text{tp}) \times (1 + \text{mv}(i) \times \text{td})) \gg \text{shift_len})$.

4. (currently amended) The method used by the hardware apparatus for determining a

reference image block in direct coding mode as claimed in claim 1, wherein in step (2),

calculating a forward motion vector MV_F of the current block by using the following formulas:

assuming $\text{scale_factor} = 2^{\text{shift_len}}$,

if $\text{mv}(i) < 0$:

$\text{MV}_F(i) = -(((\text{scale_factor} / \text{tp}) - (\text{tb} \times \text{scale_factor} / \text{tp}) \times \text{mv}(i)) \gg \text{shift_len})$;

or else,

$\text{MV}_F(i) = ((\text{scale_factor} / \text{tp}) + (\text{tb} \times \text{scale_factor} / \text{tp}) \times \text{mv}(i)) \gg \text{shift_len}$;

calculating a backward motion vector MV_B of the current block by using the following formulas:

if $\text{mv}(i) < 0$:

$MV_B(i) = ((scale_factor / tp) - (td \times scale_factor / tp) \times mv(i)) \gg shift_len;$

or else,

$MV_B(i) = -(((scale_factor / tp) + (td \times scale_factor / tp) \times mv(i)) \gg shift_len).$

5. (currently amended) The method used by the hardware apparatus for determining a reference image block in direct coding mode as claimed in claim 2, wherein $scale_factor / tp$ $[[\]]$, $tb \times scale_factor / tp$ $[[\]]$, $td / tp \times scale_factor$ parameters are pre-calculated prior to the step (1), and a calculated result is stored in a table, which is directly picked up by the calculation in step (2).

6. (currently amended) The method used by the hardware apparatus for determining a reference image block in direct coding mode as claimed in claim 1, wherein said $shift_len$ in step (2) is a natural number larger than or equal to 8.

7. (currently amended) The method used by the hardware apparatus for determining a reference image block in direct coding mode as claimed in claim 1, wherein said obtaining a motion vector of the corresponding block of the backward reference frame comprises:
selecting a macro block in a backward reference P frame with the same position as a macro block to be coded in B frame as a corresponding macro block, and obtaining a motion vector of the macro block of the P frame.